

# Midterm 1 (100 pts.)

Name: \_\_\_\_\_

True or False (2 pts. each)

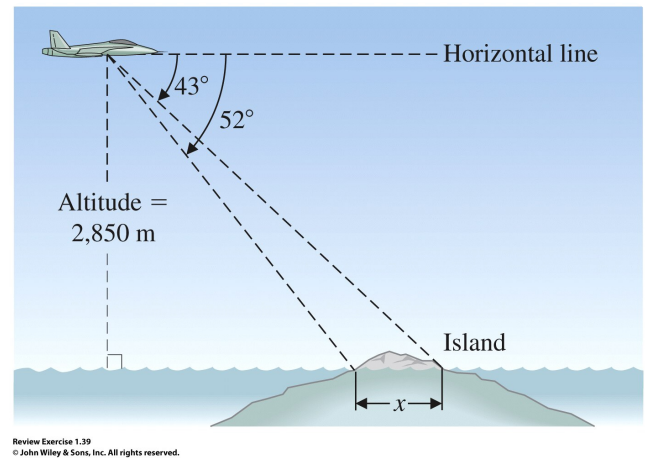
Answer the following by circling TRUE or FALSE. If the answer is false you must explain why in the space provided for full credit.

- 1.) T F \_\_\_\_\_ The point  $\left(\frac{7}{24}, \frac{11}{24}\right)$  lies on the unit circle
- 2.) T F \_\_\_\_\_ A car that travels around a circular race track at 185 mph is an example of angular velocity
- 3.) T F \_\_\_\_\_ It is possible to draw a triangle with two obtuse angles
- 4.) T F \_\_\_\_\_ A right triangle with legs  $a = 6$  cm and  $b = 8$  cm has a hypotenuse  $c = 100$
- 5.) T F \_\_\_\_\_ A central angle  $\theta = \frac{3\pi}{4}$  of a circle with radius 4 in. subtends an arc of length  $3\pi$  in.
- 6.) T F \_\_\_\_\_  $\frac{7\pi}{6} > 210^\circ$

**Multiple Choice** (4 pts. each)

7.) Given the diagram, which of the following is false?

- (a)  $\tan(43^\circ) = \frac{2850}{x + y}$
- (b)  $\cot 52^\circ = \frac{y}{2850}$
- (c)  $x = 2850 \cot(43^\circ) - 2850 \cot(52^\circ)$
- (d)  $x = 2850 \cot(52^\circ) - 2850 \cot(43^\circ)$



8.) Converting  $129.317^\circ$  to degree minute second form gives which of the following?

- (a)  $129^\circ 19' 7''$
- (b)  $129^\circ 114' 7''$
- (c)  $129^\circ 19' 1''$
- (d)  $129^\circ 11' 24''$

9.) The nearest positive and negative coterminal angles to  $\theta = \frac{3\pi}{2}$  are given by:

- (a)  $-\frac{3\pi}{2}$  and  $\frac{7\pi}{2}$
- (b)  $\frac{\pi}{2}$  and  $-\frac{9\pi}{2}$
- (c)  $\pi$  and  $-\frac{5\pi}{2}$
- (d)  $-\frac{\pi}{2}$  and  $\frac{7\pi}{2}$

10.) A satellite is placed in orbit 22,300 miles above the earth's surface. It takes 23.93 hours for it to orbit the earth. If the radius of the earth is 3964 miles, what is the angular velocity of the satellite?

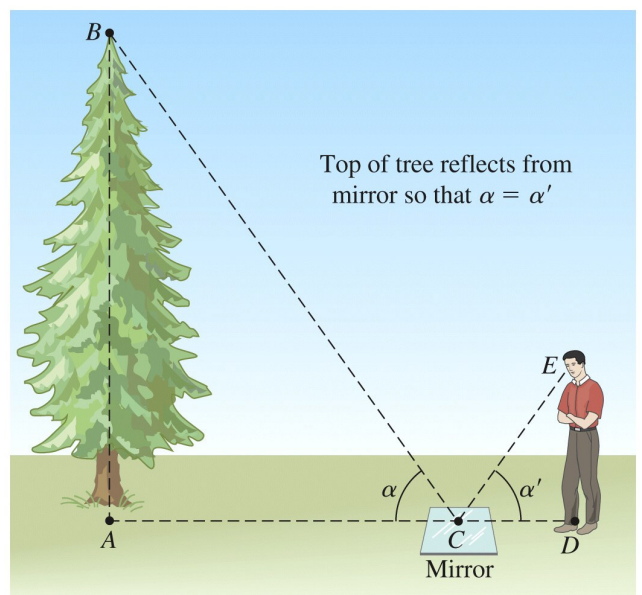
- (a)  $\frac{\pi}{23.93}$
- (b)  $\frac{2\pi}{23.93}$
- (c)  $\frac{7928\pi}{23.93}$
- (d)  $\frac{52528\pi}{23.93}$

11.) In a circle with a diameter of 15 ft. the area of a circular sector with a central angle of  $115^\circ$  is given by:

- (a)  $56.5 \text{ ft}^2$
- (b)  $112.9 \text{ ft}^2$
- (c)  $3234.4 \text{ ft}^2$
- (d)  $12937.5 \text{ ft}^2$

12.) Find the height of the tree if  $\overline{AC} = 32 \text{ ft}$ ,  $\overline{CD} = 4 \text{ ft}$  and the man is 6 ft tall.

- (a) 16.3 ft
- (b) 21.3 ft
- (c) 37.2 ft
- (d) 48.0 ft



**Short Answer** (8 pts. each)

13.) From the top of a lighthouse 30 m high, a sailboat is sighted at an angle of depression of  $10^\circ$ . How far from the base of the lighthouse is the boat?

14.) Find the exact value of the given trigonometric functions for the angle  $\theta$  given  $\sec \theta = -\sqrt{2}$  and  $\theta$  is a quadrant II angle.

(a.)  $\cot \theta$

(c.)  $\sin \theta$

(b.)  $\cos \theta$

(d.)  $\csc \theta$

15.) Find the exact value of the given trigonometric values of  $(-2, -1)$  if the terminal side of the angle  $\theta$  contains the point  $P = (-2, -1)$ .

(a.)  $\sec \theta$

(c.)  $\tan \theta$

(b.)  $\csc \theta$

(d.)  $\sin \theta$

16.) Find the exact values of the following angles using special right triangles.

(a.)  $\tan\left(\frac{\pi}{6}\right)$

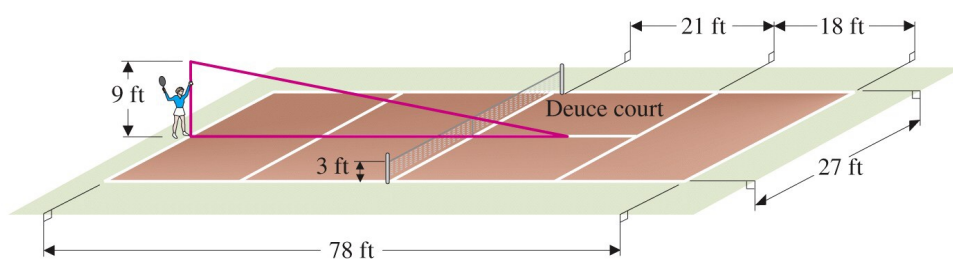
(c.)  $\cos\left(-\frac{5\pi}{4}\right)$

(b.)  $\csc(2\pi)$

(d.)  $\sin(-90^\circ)$

17.) A circular sector has an area of  $342.5 \text{ m}^2$  and a radius of  $12 \text{ m}$ . Calculate the arc length of the sector to the nearest meter. (*Hint: Find the central angle  $\theta$  of the sector first.*)

18.) A ball is served from the center of the baseline into the deuce court. If the ball is hit 9 ft above the ground and travels in a straight line down the middle of the court, and the net is 3 ft. high, how far from the base of the net will the ball land if it just clears the top of the net? (*Compute your answer to one decimal place.*)



19.) Simplify the following using fundamental trigonometric identities.

(a)  $\cot(-x)\sin(-x)$

(b)  $(\csc x)(\cot x)(1 - \cos^2 x)$

20.) From the sunroof of an apartment building, the angle of depression to the base of an office building is  $51.4^\circ$  and the angle of elevation to the top of the office building is  $43.2^\circ$ . If the office building is 847 ft. high, how far apart are the two buildings? (*Hint: use tangent.*)

